DETAILED ACTION

Response to Amendment

1. This Office Action is responsive to the amendment received 5 January 2010.

2. Claim 18 is amended. Claim 22 was previously cancelled.

3. In summary, claims 1-21 and 23 are pending in the application.

4. The amendment of independent claim 18 has necessitated the new grounds of rejection applied to claim 18 and dependent claims 19 and 20. The grounds of rejection for claims 1-17, 21 and 23 remain unchanged.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyachi et al. (U. S. Patent Application Publication 2003/0043165 A1, already of record hereafter '165) and in view of Myers (U. S. Patent Application Publication 2002/0041288 A1, already of record, hereafter '288).

6. Regarding claim 1 (Previously Amended), Miyachi teaches a method for correcting a color image composed of a plurality of individual colors ('165; ¶ 0022), the method comprising the steps of: correcting the gamut of the color image (adjust a color reproduction range; i.e. gamut; '165; ¶ 0004); and smart clipping the corrected image by "adding white" to out-of-gamut digital data of the color image ('165; ¶ 0071; equations at the bottom of paragraph [0071] where selecting each color signal in turn adds in a proportional amount of the remaining two color signals which is equivalent to adding white), and scaling said adjusted colors to a maximum value based on a maximum value of one said adjusted colors ('165; ¶ 0071 – equations at the end of the paragraph show that each signal is scaled proportionally to the intensity of the signal resulting in the lower valued signals (i.e. darker) receiving less added white), but does not explicitly teach wherein said clipping comprises the steps of: adjusting said individual color of said out-of-gamut digital data by linearly scaling said individual colors based on a smallest value of said digital data individual colors, wherein said adjusted smallest value is set to a known value within said gamut of the color image.

Myers, working in the same field of endeavor, however, teaches wherein said clipping comprises the steps of: adjusting said individual color of said out-of-gamut digital data by linearly scaling

said individual colors ('288; abstract; ¶ 0026-0029) based on a smallest value of said digital data individual colors ('288; ¶ 0036; Min(RGB)) minimum of the three primary color output data words), wherein said adjusted smallest value is set to a known value within said gamut of the color image ('288; ¶ 0036; Min(RGB), for the benefit of removing the effective white from the dynamic range of each color signal thus allowing the following scaling step to have more signal range to boost the perceived colorfulness of the image. It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined Myers' minimum white value teachings with the color boosting teachings of Miyachi for the benefit of producing an enhanced color image by removing the effective white from the dynamic range of each color signal thus allowing the following scaling step to have more signal range to boost the perceived colorfulness of the image.

7. In regard to claim 2 (Original), Miyachi further teaches wherein the smart clipping step of "adding of white" further comprises the step of scaling with the brightness of digital data having dark digital data get less white added than bright digital data ('165; ¶ 0071 – equations at the end of the paragraph show that each signal is scaled proportionally to the intensity of the signal resulting in the lower valued signals (i.e. darker) receiving less added white).

8. Regarding claim 3 (Original), Miyachi and Myers teach the method of claim 1 and Miyachi further teaches further comprising the step of reducing overall brightness of the color image ('165; ¶ 0083-0085). Each color signal is scaled by a multiplier that varies form 0 to user or designer set maximum thus reducing the overall brightness of the color image.

9. In regard to claim 4 (Original), Miyachi and Myers teach the method of claim 3 and Miyachi further teaches wherein said reducing step further comprises the step of multiplying digital image data of the color image by a fixed value but does not teach a specific value of 0.85. Miyachi, however, does teach multiplying the input color values by constants that vary up to a value of 2 and suggests a value of 0.5 ('165; ¶ 0073). It would have been obvious to one of ordinary skill in the art at the time of the invention to have made the design choice of selecting 0.85 as a scale factor after evaluating a number of images on a targeted display just as was done in the instant application at paragraph [0037].

10. Regarding claim 5 (Original), Miyachi and Myers teach the method of claim 3 and Miyachi further teaches wherein said reducing step further comprises the step of determining the reduction as a function of an input gamut and a display gamut ('165; Abstract; ¶ 0001; ¶ 0027).

11. In regard to claim 6 (Original), Miyachi and Myers teach the method of claim 3 and Miyachi further teaches wherein said reducing step further comprises the step of determining the reduction as a function of a saturation of the incoming signal ('165; ¶0025).

12. Regarding claim 7 (Original), Miyachi and Myers teach the method of claim 6 and Miyachi further teaches wherein said function is 0 when the saturation is equal to 0, maximal when the saturation is greater than some value less than maximum but does not explicitly teach the exact value of 0.750, and teaches that it is equal to a monotonically increasing function as a

function of the saturation when the saturation is in the range between 0 and some value less than maximum but does not explicitly teach the exact value of 0.75 (‘165, ¶ 0084-0090). Miyachi teaches limiting the maximum to less than one but leaves the design choice to the equipment designer. It would have been obvious to one of ordinary skill in the art at the time of the invention to choose a value such as 0.75 after evaluating a number of images on a targeted display.

13. In regard to claim 8 (Previously Amended), Miyachi and Myers teach the method of claim 1 and Miyachi further teaches the method as further comprising the steps of: performing a gamma correction on the digital image data before the step of correcting the gamut; and, performing an inverse gamma correction on the smart clipped image (‘165; ¶ 0262-0263).

14. Regarding claim 9 (Original), Miyachi further teaches the method as further comprising the step of reducing the overall brightness of the color image (‘165; 0269-0271 - equations these paragraphs show that each signal is scaled proportionally to the intensity of the signal resulting in the lower valued signals (i.e. darker) receiving less added white).

15. In regard to claim 10 (Original), Miyachi further teaches wherein said reducing step further comprises the step of determining the reduction as a function of a saturation of the incoming signal (‘165; ¶ 0261-0263).

16. Regarding claim 11 (Original), Miyachi further teaches wherein said function is 0 when the saturation is equal to 0, maximal when the saturation greater than some value less than one but does not explicitly teach the exact value of 0.75, and equal to a monotonically increasing function as a function of the saturation when the saturation is in the range between 0 and some value less than maximum but does not explicitly teach the exact value of 0.75. It would have been obvious to one of ordinary skill in the art at the time of the invention to choose a value such as 0.75 after evaluating a number of images on a targeted display.

17. In regard to claim 12 (Previously Amended), Miyachi teaches an apparatus (device) for primary color correction and clipping, comprising: a means for receiving digital data of a color image having a source gamut; a display having a display gamut (‘165; fig. 2); one of a program memory storing and a calculation logic device providing (signal processing means) - (i) a plurality of algorithms, that includes smart clipping algorithms (adjust a color reproduction range; i.e. gamut; ‘165; ¶ 0004), for mapping the source gamut to the display gamut, and (ii) a multi-step `smart` clipper module that executes the plurality of algorithms for mapping the source gamut to the display gamut (‘165; ¶ 0071; ¶ 0083-0085; ¶ 0261-0263); and a controller/processing unit configured to control receipt of the digital data, execute the `smart` clipper module to accomplish mapping the source gamut to the display gamut for the received digital data (‘165; fig. 8), and scaling said adjusted colors to a maximum value based on a maximum value of one of said adjust colors ('165; ¶ 0071 – equations at the end of the paragraph show that each signal is scaled proportionally to the intensity of the signal resulting in the lower valued signals (i.e. darker) receiving less added white), and output the mapped digital

data to the display ('165; fig. 2), but does not teach wherein said clipping comprises the steps of: adjusting said individual colors of said out-of-gamut digital data by linearly scaling said individual colors based on a smallest value of said digital data individual colors, wherein said adjusted smallest value is set to a known value.

Myers, working in the same field of endeavor, however, teaches wherein said clipping comprises the steps of: adjusting said individual color of said out-of-gamut digital data by linearly scaling said individual colors (‘288; abstract; ¶ 0026-0029) based on a smallest value of said digital data individual colors (‘288; ¶ 0036; Min(RGB) minimum of the three primary color output data words), wherein said adjusted smallest value is set to a known value within said gamut of the color image (‘288; ¶ 0036; Min(RGB)) for the benefit of removing the effective white from the dynamic range of each color signal thus allowing the following scaling step to have more signal range to boost the perceived colorfulness of the image. It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined Myers’ minimum white value teachings with the color boosting teachings of Miyachi for the benefit of producing an enhanced color image by removing the effective white from the dynamic range of each color signal thus allowing the following scaling step to have more signal range to boost the perceived colorfulness of the image.

18. Regarding claim 13 (Original), Miyachi further teaches further comprising a storage device for storing received digital data and output digital data of a color image (‘165; ¶0069-0071).

19. In regard to claim 14 (Previously Amended), Miyachi further teaches wherein the plurality of algorithms comprises at least one of: executable gamma correction algorithms (‘165; ¶ 0262-0263); gamut mapping algorithms to reduce brightness of digital data of a color image (‘165; 0269-0271); smart clipping algorithms to correct digital data of a color image by "adding white" to out-of-gamut digital data of the color image (‘165; ¶ 0071); and saturation dependent attenuation algorithms (‘165; ¶ 0261-0263). Miyachi’s adding white is the set of equations at the bottom of paragraph [0071] where selecting each color signal in turn adds in a proportional amount of the remaining two color signals which is equivalent to adding white. It would have been obvious to one of ordinary skill in the art at the time of the invention to use Miyachi's “adding white” to remove this constant term form the input to allow proportional scaling of the colors in further processing.

20. Regarding claim 15 (Original), Miyachi and Myers teach the apparatus of claim 13 and Miyachi further teaches wherein the smart clipping algorithms further comprise magnifying the clipping effect based on intensity of digital data of the color image ('165; ¶ 0071 – equations at the end of the paragraph show that each signal is scaled proportionally to the intensity of the signal resulting in the lower valued signals (i.e. darker) receiving less added white).

21. In regard to claim 16 (Previously Amended), Miyachi and Myers teach the apparatus of claim 12 and Miyachi further teaches wherein the plurality of algorithms comprises at least one of: executable gamma correction algorithms (‘165; ¶ 0262-0263); gamut mapping algorithms to reduce brightness of digital data of a color image (‘165; ¶ 0083-0085); smart clipping algorithms

to correct digital data of a color image by "adding white" to out-of-gamut digital data of the color image (‘165; ¶ 0071); and saturation dependent attenuation algorithms (‘165; ¶0025).

22. Regarding claim 17 (Original), Miyachi further teaches wherein the smart clipping algorithms further comprise magnifying the clipping effect based on intensity of digital data of the color image (‘165; ¶ 0071-0072).

23. In regard to claim 18 (Currently Amended), Miyachi teaches a `smart` clipper apparatus for primary color correction and clipping, comprising: a plurality of algorithms (‘165; ¶ 0071; ¶ 0083-0085; ¶ 0261-0263), that includes <u>at least a</u> smart clipping algorithms <u>that “adds white” to out-of-gamut digital data of the color image</u> (‘165; ¶ 0071; equations at the bottom of the paragraph [0071] where selecting each color signal in turn adds in a proportional amount of the remaining two color signals which is equivalent to adding white), and a multi-step `smart` clipper module that executes said plurality of algorithms (‘165; ¶ 0071; ¶ 0083-0085; ¶ 0261-0263) , for mapping a source gamut to a display gamut, but does not explicitly teach<u>, adjusts said individual colors of said out-of-gamut digital data by linearly scaling said individual color based on a smallest value of said digital data individual colors, wherein said adjusted smallest value is set to a known value within said gamut of the color image, and scaling said adjusted colors to a maximum value based on a maximum value of one of said adjusted colors</u>. Miyachi teaches color correction and clipping in six different embodiments, thus it would be obvious to one of ordinary skill in the art that these six embodiments teach a plurality of algorithms.

Myers, working in the same field of endeavor, teaches wherein clipping comprises: <u>adjusts said individual colors of said out-of-gamut digital data by linearly scaling</u>(‘288; ¶ 0026-0028) <u>said individual color based on a smallest value of said digital data individual colors</u> (‘288; abstract; ¶ 0029), <u>wherein said adjusted smallest value is set to a known value within said gamut of the color image</u> (‘288; ¶ 0036; Min(RGB)) <u>and scaling said adjusted colors to a maximum value based on a maximum value of one of said adjusted colors</u> (‘288; ¶ 0036; ¶ 0061-0063), for the benefit of producing a color enhanced image that presents the best colorfulness that can be produced on the limited capability of a mobile display. It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined Myers’ minimum white value teachings with the color boosting teachings of Miyachi for the benefit of producing an enhanced color image by removing the effective black from the dynamic range of each color signal thus allowing the following scaling step to have more signal range to boost the perceived colorfulness of the image.

24. Regarding claim 19 (Previously Amended), Miyachi further teaches wherein the plurality of algorithms comprises at least one of: executable gamma correction algorithms (‘165; ¶ 0262-0263); gamut mapping algorithms to reduce brightness of digital data of a color image (‘165; 0269-0271); smart clipping algorithms to correct digital data of a color image by "adding white" to out-of-gamut digital data of the color image (‘165; ¶ 0071); and saturation dependent attenuation algorithms (‘165; ¶0025).

25. In regard to claim 20 (Original), Miyachi further teaches wherein the smart clipping algorithms further comprise magnifying the clipping effect based on intensity of digital data of the color image ('165; ¶ 0071 – equations at the end of the paragraph show that each signal is scaled proportionally to the intensity of the signal resulting in the lower valued signals (i.e. darker) receiving less added white).

26. Claims 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Myers (U. S. Patent Application Publication 2002/0041288 A1, hereafter '288) as applied to claims 1-20 above, and in view of Miyachi et al. (U. S. Patent Application Publication 2003/0043165 A1, already of record hereafter '165) as applied to claims 1-20 above.

27. Regarding claim 21 (Previously Amended), Myers teaches a computer readable medium, comprising instructions accessed by a processor ('288; ¶ 0018) for causing said processor to execute: but does not teach a plurality of algorithms, that includes smart clipping algorithms, for mapping a source gamut to a display comprising: executable gamma correction algorithms; gamut mapping algorithms to reduce brightness of digital data of a color image; smart clipping algorithms to correct digital data of a color image by "adding white" to out-of-gamut digital data of the color image, and continues to teach wherein said clipping comprises the steps of: adjusting said individual colors of said out-of-gamut digital data by linearly scaling said individual colors ('288; abstract; ¶ 0026-0029) based on a smallest value of said digital data individual colors ('288; ¶ 0036; Min(RGB)) minimum of the three primary color output data words), wherein said adjusted smallest value is set to a known value ('288; ¶ 0036; Min(RGB); and scaling said

adjusted colors to a maximum value based on a maximum value of one of said adjusted colors (‘288; ¶ 0036; ¶ 0061-0063), and does not teach a multi-step `smart` clipper module that executes said plurality of algorithms.

Miyachi, working in the same field of endeavor, however teaches a plurality of algorithms (‘165; ¶ 0071; ¶ 0083-0085; ¶ 0261-0263), that includes smart clipping algorithms (‘165; ¶ 0071; ¶ 0083-0085; ¶ 0261-0263), for mapping a source gamut to a display comprising: executable gamma correction algorithms (‘0165; ¶ 0262); gamut mapping algorithms to reduce brightness of digital data of a color image (‘165; 0269-0271); smart clipping algorithms to correct digital data of a color image by “adding white” to out-of-gamut digital data of the color image (‘165; ¶ 0071; equations at the bottom of paragraph [0071] where selecting each color signal in turn adds in a proportional amount of the remaining two color signals which is equivalent to adding white) and also teaches a multi-step `smart` clipper module that executes said plurality of algorithms (‘165; ¶ 0071; ¶ 0083-0085; ¶ 0261-0263) for the benefit of providing a base computing system with multiple correction algorithms in which the specific color corrections of Myers can be incorporated to produce a bright color displayed image without apparent modification of the color tone or hue. It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the color correction system teachings of Miyachi with the color correction teachings of Myers for the benefit of providing a base computing system with multiple correction algorithms in which the specific color corrections of Myers allow the production of a bright color displayed image without apparent modification of the color tone or hue.

28. Claim 22 (Cancelled).

29. Regarding claim 23 (Previously Amended), Myers and Miyachi teach the computer readable medium of claim 21 and Miyachi further teaches wherein the smart clipping algorithms further comprise magnifying the clipping effect based on intensity of digital data of the color image ('165; ¶ 0071 – equations at the end of the paragraph show that each signal is scaled proportionally to the intensity of the signal resulting in the lower valued signals (i.e. darker) receiving less added white).

Response to Arguments

30. Applicant's arguments filed 5 January 2010 have been fully considered but they are not persuasive.

31. The Applicants argue to claims 1-17 and to claims 18-20 as amended. Independent claim 18 has been amended so that it now possesses similar features, limitations and scope to those which are recited in the three other independent claims, 1, 12 and 21.

32. The abstract of instant application states that the invention is attempting to provide the colorfulness of an EBU (European Broadcast Union) display on a mobile display by providing 'smart' clipping to those colors that cannot be represented on the mobile display. Thus the invention is mapping the broader color gamut of the EBU display to the more limited gamut of the mobile display.

33. The Myers reference now used in the rejection of amended claim 18 and previously used in the rejection of claims 1, 12 and 21 is performing the same color matching between digital display devices and as is shown in the title, abstract and specification of the '288 document. Myers discusses the mapping of a larger color gamut digital image to devices having a more limited gamut. This establishes the fact that Myers is mapping a color gamut from one device to the color gamut of another device and not merely mapping gradation levels without regard to the gamut limits of the output device.

34. The Examiner respectfully disagrees with the statements that the references fail to recite that the adjustment of the colors is performed by linearly scaling individual colors based on a smallest out-of-gamut color so that the smallest out-of-gamut color is adjusted to a known value with in the gamut of colors. As stated in the claim rejection section above for amended claim 18, Myers <u>adjusts said individual colors of said out-of-gamut digital data by linearly scaling said individual color</u> ('288; ¶ 0026-0029, "Once ratios are obtained for each dual and single source colors, the color LUTs can be generated (step 4). In order to create the LUTs from the ratio values, the ratio values are first scaled to the range defined by the color matching algorithm and then **linearly interpolated** over that range. In this particular example, the color values accessing the LUTs are represented as 8-bit binary numbers that range from a minimum value of 0 to a maximum value of 255.")

35. Miyachi also discloses linear scaling in '165; ¶ 0071 – equations at the end of the paragraph show that each signal is scaled proportionally to the intensity of the signal.

36. The Applicants argue that the references fail to teach that the smallest value of the input color signals is set to a known value within the gamut of colors (Here, output gamut is implied as the purpose of the invention as stated by the Examiner at the top of this section is to match a wide input color gamut to the smaller color gamut of the mobile display device.)

37. The Examiner cited Myers based on a smallest value of said digital data individual colors ('288; ¶ 0036; Min(RGB)) minimum of the three primary color output data words as presented in equation 1, which is shown in figure 2 to be the smallest value of the digital input colors. Later in the processing cited in Myers, the Min value or smallest value is set to zero which is within the output gamut of the mobile display. See the remainder of the rejections of the independent claims for elements not argued.

38. The Applicants argue that the references fail to teach adjusting the color values based on a maximum adjusted value.

39. The Examiner cited Myers '288; ¶ 0061-0063 which shows the scaling of the input to match the maximum of the target color gamut; which in the example given, has a value 255 for the binary range of 0 to 255 for the example output device. These scaling ratios are discussed by the Applicants in their remarks and it is this feature that is based on the maximum of input to the maximum input capability of the target output device as shown in an example in Table 1 and in the Examiner's cited text. Note in the Myers' example, that the scaling ratio values are

percentages less than 100% as the example input range is larger (out of gamut) than the range of the output device just as shown in the examples of the instant application. Myers is applying the factor to the input so it limits the input driving value to a value that the mobile display device can handle, a digital value of 255 in the example given.

40. The forgoing responses to the Applicants' arguments apply to all the independent claims (1, 12, 18 and 21).

41. The motivation to combine Miyachi and Myers would have been obvious at the time of the invention to one of ordinary skill in the art who may have been attempting to improve the colorfulness of a mobile or limited gamut product. By combining Miyachi and Myers one has Miyachi providing the teaching of higher level methods and systems to convert a broad color gamut source to a smaller color gamut display device and Myers builds upon these higher level teachings and provides the lower level details making it quicker and easier for the skilled person to develop their mobile device so that is has improved colorfulness over competing devices.

42. Claims 2-11, 13-17, 19-20 and 23 are rejected as being dependent upon a rejected base claim and for the individual features they add as shown in the claims rejection section above.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edward Martello whose telephone number is (571) 270-1883. The examiner can normally be reached on M-F 7:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Xiao Wu can be reached on (571) 272-7761. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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